GVIRF 2018 Plenary 6: Polio Endgame: Needs and Opportunities	
Rapporteur: Angela Hwang (Consultant)	
Session Outline	**Chair:** Roland Sutter (Coordinator, Polio Research, Policy and Containment, WHO) **Presentations:** Introduction, Roland Sutter (Coordinator, Polio Research, Policy and Containment, WHO) *Global tOPV withdrawal: "The Switch" experience*, Alejandro Ramirez Gonzalez (Technical Officer, WHO) *Two years after the tOPV to bOPV switch: What happened to Poliovirus Type 2?* Ondrej Mach (WHO) *Polio Vaccines – Research & Development Updates*, Peter Dull (Deputy Director Vaccine Development, Bill & Melinda Gates Foundation) *Research for polio policy making: Lessons learned*, Roland Sutter (Coordinator, Polio Research, Policy and Containment, WHO) **Panelists:** Suresh Jadhav (Executive Director, Serum Institute of India, Ltd.) Pradeep Haldar (Deputy Commissioner, Immunization, Ministry of Health and Family Welfare, India)
Objectives of the session	*To discuss:* • Why Sabin type 2 oral poliovirus vaccine was withdrawn, why it was unavoidable, what was done and the preliminary outcomes • Priority research and product development for policy decisions and improved options in sustaining polio eradication
Main outcome	• The Switch was an unprecedented and monumental success for everyone involved, requiring significant resources and strong political support • The global community is developing improved vaccines and treatments to address the continuing challenges of polio eradication
Summary	Thirty years after the 1988 World Health Assembly resolution to eradicate polio, substantial progress has been made but significant challenges lie ahead. The number of polio-endemic countries decreased from 125 in 1988 to 3 in 2018 and the number of polio cases declined by over 99.9% during this same period. Four WHO regions were declared free of wild poliovirus, and wild type poliovirus 2 was declared eradicated in 2015. This progress led to the polio endgame strategy, starting with the switch from trivalent oral poliovirus vaccine (tOPV) to a bivalent formulation (bOPV) omitting type 2, the main cause of vaccine-derived paralytic poliomyelitis. During and just after the transition period, there is a risk of type 2 vaccine-derived polioviruses emerging just as population immunity to type 2 begins to decline. To minimize this risk, the OPV switch was conducted in minimal time with careful monitoring of vaccine supply to ensure complete removal of tOPV. In the course of 2 weeks from April 17 to May 1 2016, 155 countries representing ~130 million annual births switched from tOPV to bOVP in

	synchrony. Success factors included partnership, coordination and collaboration at all levels, clear roles and responsibilities, country and regional leadership and ownership, having a defined timeframe, timely dissemination of information, and timely disbursal of dedicated funding to catalyse country efforts. Lessons learned from the 2016 switch will inform the withdrawal of other Sabin serotypes post eradication. Post switch surveillance has shown higher-than expected numbers of type 2 outbreaks and events compared to modelled forecasts. Seven outbreaks were identified in the 2 years post switch, slightly higher than the 5 predicted. Thirty-four events were identified, significantly higher than the 14 predicted: however, many of these events are associated with Type 2 OPV campaigns to prevent the spread of vaccine-derived polio. The risk of vaccine-derived type 2 polio persists, particularly in inaccessible and conflict-affected areas. Because inactivated polio vaccines (IPVs) do not block transmission, a stock of Type 2 OPV must be maintained in the event of a type 2 outbreak. OPV manufacture cultures large quantities of live virus, and careful containment is required to avoid accidental release into an unprotected population. If successful, ongoing efforts to develop IPVs that confer mucosal immunity and OPV production using safer genetically stable approaches or non-infectious virus-like particles will minimize containment risks while addressing the persistent risk of vaccine-derived poliovirus. For chronic shedders, antivirals and monoclonal antibodies are in development to stop excretion of vaccine-derived poliovirus. In 2017, SAGE recommended screening individuals with signs of immunodeficiency for polio excretion, to identify and treat chronic shedders and minimize the spread of the virus. To further mitigate the risk of vaccine-derived polio, IPV is being introduced in routine infant vaccination schedules globally. All countries should maintain IPV in their immunization schedules for at least 10 years after global OPV withdrawal. IPV is supply-limited, so dose-sparing approaches are under evaluation. Hexavalent vaccines that combine IPV with DTP, Hib and Hep B promise to streamline delivery but limit options for use in outbreak response campaigns. Serum Institute of India is one of several manufacturers that is aggressively ramping up its IPV production to supply sufficient antigen for global needs.

Key references or quotes	

Thinking in 1988 when eradication goal adopted and what has been learned - I

THINKING IN 1988	THINKING IN 2018
•Need to eradicate three wild polioviruses (WPV 1,2,3)	•Need to eradicate six polioviruses (WPV 1,2,3 and Sabin vaccine viruses 1,2,3)
•Trivalent OPV would be adequate	•Need monovalent and bivalent OPV
•OPV could cause vaccine-associated polio in vaccine recipients or close contacts	•OPV, through mutations, could reacquire phenotypic characteristics of WPVs leading to outbreaks (cVDPVs)
•Acute flaccid paralysis (AFP) surveillance was adequate to find virus	•AFP surveillance is not enough; environmental surveillance offers much in detecting virus
•Primary immunodeficient chronic shedders (iVDPVs) of vaccine virus could develop polio but were not a danger to the community	•iVDPVs could theoretically reseed a community and lead to cVDPVs and polio outbreaks
•Inactivated Polio Vaccine (IPV) had no role in achieving eradication in developing countries with poor sanitation and hygiene	•IPV may have a role in achieving eradication but will be very important in sustaining eradication as Sabin Vaccine Viruses are withdrawn
•Sustaining eradication, with a major focus on containment, was not a part of decision-making	•Sustaining eradication, with the need to contain and collect or destroy specimens (such as virus-containing stools), is an important part of current decision-making
•Vaccination could be stopped once polio eradication was certified, as was done with smallpox	•There is a need to continue vaccination for some period and potentially indefinitely after WPV is eradicated and Sabin viruses are withdrawn
•Everything needed for eradication was already known	•Continuing need for an extensive research program dealing with issues such as: • Development of safer vaccines • Development of vaccines that not only provide individual protection but community protection • The role of IPV and the optimal schedule, and how to make it cheaper • Detecting primary immunodeficient shedders and developing antivirals